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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/717,624	11/21/2003	Richard Ullyott	2993-484US CMB/al	8610

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EXAMINER	
KIM, TAE JUN	

ART UNIT	PAPER NUMBER
3746	

DATE MAILED: 12/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

E

Office Action Summary	Application No.	Applicant(s)	
	10/717,624	ULLYOTT, RICHARD	
	Examiner	Art Unit	
	Ted Kim	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 October 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10,12-17 and 19-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10, 12-17, 19-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: page 7, line 16, "172" appears it should be –174--.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-10, 12-17, 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Redinger, Jr. et al (4,069,662) in view of any of Falk (3,421,318), McArthur (6,209,309) and Nystrom (3,999,388). Redinger, Jr et al teach in a gas turbine engine, a method for controlling a gap between a rotor blade tip and a turbine shroud, said method comprising: determining a cooling air requirement for said shroud; and controlling admission of cooling air to said turbine shroud area by adjusting a duty cycle of a modulating signal according to said cooling air requirement (col. 4, lines 12+); a valve 44 controlling an air passage for said cooling air and wherein said controlling admission of cooling air comprises controlling said valve; said valve is positionable in one of a fully open (on) position, when maximal air cooling results, and a fully closed

(off) position, when no air cooling results; the valve control unit uses a signal representative an operating condition of said gas turbine engine for controlling said valve; said modulating signal determines the position of said valve; said duty cycle comprises a light cooling mode and heavy cooling mode, wherein less cooling air is provided to the turbine area in said light cooling mode than in said heavy cooling mode. As for said operating condition is dependent on at least one of an aircraft cycle condition of said gas turbine selected from the group consisting of start; take-off, run-up, landing, normal cruise, low-level cruise, high-level cruise, low speed cruise, high speed cruise, reverse thrust, climb and descent, applicant lists all the known operating conditions of the engine, and the control signal will inherently be taken at one of these operation conditions, note the system is not turned on when on the ground (col. 4, lines 40+). Redinger, Jr et al teach various aspects of the claimed invention including modulating the on-off valve but does not specifically teach a PWM valve. Falk teaches modulating flows with a PWM valve with a duty cycle (col. 1, lines 11+) is old and well known in the art. McArthur teaches using a PWM valve with a duty cycle is well known for its metering ability and low costs. Nystrom teaches using a PWM with a duty cycle solenoid controlled valve 37 to modulate a gas flow is old and well known in the art. It would have been obvious to one of ordinary skill in the art to employ a PWM valve with a duty cycle for the on-off control of the clearance control air, due to its low costs and/or flow modulating abilities and/or precise metering abilities. As for the duty cycles being between 0-50% in light cooling and 50-100% in heavy cooling, this is well known in the art as an obvious matter

of using the workable ranges in the art. It would have been obvious to one of ordinary skill in the art to employ the claimed ranges as an obvious matter of finding the workable ranges in the art.

4. Claims 1-10, 12-17, 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pellow (5,772,400) in view of any of Falk (3,421,318), McArthur (6,209,309) and Nystrom (3,999,388). Pellow teaches in a gas turbine engine, a method for controlling a gap between a rotor blade tip and a turbine shroud, said method comprising: determining a cooling air requirement for said shroud; and controlling admission of cooling air to said turbine shroud area by adjusting a duty cycle of a modulating signal (col. 3, lines 8+) according to said cooling air requirement; a valve 70 controlling an air passage for said cooling air and wherein said controlling admission of cooling air comprises controlling said valve; said valve is positionable in one of a fully open (on) position, when maximal air cooling results, and a fully closed (off) position, when no air cooling results; the valve control unit uses a signal representative an operating condition of said gas turbine engine for controlling said valve (e.g. throttle, fuel flow or other aircraft control demand); said modulating signal determines the position of said valve; said duty cycle comprises a light cooling mode and heavy cooling mode, wherein less cooling air is provided to the turbine area in said light cooling mode than in said heavy cooling mode. As for said operating condition is dependent on at least one of an aircraft cycle condition of said gas turbine selected from the group consisting of start; take-off, run-up, landing, normal cruise, low-level cruise, high-level cruise, low speed

cruise, high speed cruise, reverse thrust, climb and descent, applicant lists all the known operating conditions of the engine, and the control signal will inherently be taken at one of these operation conditions. Pellow teaches various aspects of the claimed invention including modulating the on-off valve but does not specifically teach a PWM valve. Falk teaches modulating flows with a PWM valve with a duty cycle (col. 1, lines 11+) is old and well known in the art. McArthur teaches using a PWM valve with a duty cycle is well known for its metering ability and low costs. Nystrom teaches using a PWM with a duty cycle solenoid controlled valve 37 to modulate a gas flow is old and well known in the art. It would have been obvious to one of ordinary skill in the art to employ a PWM valve with a duty cycle for the on-off control of the clearance control air, due to its low costs and/or flow modulating abilities and/or precise metering abilities. As for the duty cycles being between 0-50% in light cooling and 50-100% in heavy cooling, this is well known in the art as an obvious matter of using the workable ranges in the art. It would have been obvious to one of ordinary skill in the art to employ the claimed ranges as an obvious matter of finding the workable ranges in the art.

5. Claims 1-10, 12-17, 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Franconi et al (6,910,851) in view of any of Falk (3,421,318), McArthur (6,209,309) and Nystrom (3,999,388). Franconi et al teach in a gas turbine engine, a method for controlling a gap between a rotor blade tip and a turbine shroud, said method comprising: determining a cooling air requirement for said shroud; and controlling admission of cooling air to said turbine shroud area by adjusting a modulating

signal according to said cooling air requirement (col. 7, lines 62+); a valve 302 controlling an air passage for said cooling air and wherein said controlling admission of cooling air comprises controlling said valve; said valve is positionable in one of a fully open (on) position, when maximal air cooling results, and a fully closed (off) position, when no air cooling results; the valve control unit 354 uses a signal representative an operating condition of said gas turbine engine for controlling said valve; said modulating signal determines the position of said valve; said duty cycle comprises a light cooling mode and heavy cooling mode, wherein less cooling air is provided to the turbine area in said light cooling mode than in said heavy cooling mode; said operating condition is dependent on at least one of an aircraft cycle condition of said gas turbine selected from the group consisting of start, take-off, run-up, landing, normal cruise, low-level cruise, high-level cruise, low speed cruise, high speed cruise, reverse thrust, climb and descent (see col. 7, lines 62+; col. 8, lines 4+). The valve is a solenoid valve and as such would appear to inherently have a duty cycle. Alternately, Falk teaches modulating flows with a PWM valve with a duty cycle (col. 1, lines 11+) is old and well known in the art. McArthur teaches using a PWM valve with a duty cycle is well known for its metering ability and low costs. Nystrom teaches using a PWM with a duty cycle solenoid controlled valve 37 to modulate a gas flow is old and well known in the art. It would have been obvious to one of ordinary skill in the art to employ a PWM valve with a duty cycle for the on-off control of the clearance control air, due to its low costs and/or flow modulating abilities and/or precise metering abilities. As for the duty cycles being

between 0-50% in light cooling and 50-100% in heavy cooling, this is well known in the art as an obvious matter of using the workable ranges in the art. It would have been obvious to one of ordinary skill in the art to employ the claimed ranges as an obvious matter of finding the workable ranges in the art.

6. Claims 1-10, 12-17, 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 58-214603 in view of any of Falk (3,421,318), McArthur (6,209,309) and Nystrom (3,999,388). JP '603 teaches in a gas turbine engine, a method for controlling a gap between a rotor blade tip and a turbine shroud, said method comprising: determining a cooling air requirement for said shroud; and controlling admission of cooling air to said turbine shroud area by adjusting a modulating signal according to said cooling air requirement; a valve 16c-1, 16c-2, 16t-1, 16t-2 controlling an air passage for said cooling air and wherein said controlling admission of cooling air comprises controlling said valve; said valve is positionable in one of a fully open (on) position, when maximal air cooling results, and a fully closed (off) position, when no air cooling results; the valve control unit 20 uses a signal representative an operating condition of said gas turbine engine for controlling said valve; said modulating signal determines the position of said valve; said duty cycle comprises a light cooling mode and heavy cooling mode, wherein less cooling air is provided to the turbine area in said light cooling mode than in said heavy cooling mode. The valve is a solenoid valve and as such would appear to inherently have a duty cycle. Alternately, Falk teaches modulating flows with a PWM valve with a duty cycle (col. 1, lines 11+) is old and well known in the art.

McArthur teaches using a PWM valve with a duty cycle is well known for its metering ability and low costs. Nystrom teaches using a PWM with a duty cycle solenoid controlled valve 37 to modulate a gas flow is old and well known in the art. It would have been obvious to one of ordinary skill in the art to employ a PWM valve with a duty cycle for the on-off control of the clearance control air, due to its low costs and/or flow modulating abilities and/or precise metering abilities. As for the duty cycles being between 0-50% in light cooling and 50-100% in heavy cooling, this is well known in the art as an obvious matter of using the workable ranges in the art. It would have been obvious to one of ordinary skill in the art to employ the claimed ranges as an obvious matter of finding the workable ranges in the art.

Response to Arguments

7. Applicant's arguments filed 10/31/2005 have been fully considered but they are not persuasive with regard to the 35 USC 103 rejections.

8. Applicant argues that in response to applicant's argument that there is no motivation to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). Applicant specifically argues:

> "citing a potential advantage of one limitation of the claimed invention (low costs and/or flow modulating capabilities and/or precise metering abilities) is not an argument for supporting the suggestion or motivation to make the claimed invention obvious to a person skilled in the art."

On the contrary, the advantages expressed in the references for using a PWM valve with a duty cycle for the on-off control, due to its low costs and/or flow modulating abilities and/or precise metering abilities is precisely a teaching to one of ordinary skill in the art as to why one of ordinary skill in the art would pursue such a combination. Each of the base references cited devices employs an on-off control or solenoid valve for controlling the clearance air. PWM control for such on-off or solenoid valves is expressly taught by any of Falk (3,421,318), McArthur (6,209,309) and Nystrom (3,999,388) as advantageous for the reasons expressed above and would thus teach one of ordinary skill in the art why PWM control should be utilized.

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the

advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Ted Kim whose telephone number is 571-272-4829. The Examiner can be reached on regular business hours before 5:00 pm, Monday to Thursday and every other Friday.

The fax numbers for the organization where this application is assigned are 571-273-8300 for Regular faxes and 571-273-8300 for After Final faxes.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Thorpe, can be reached at 571-272-4444.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist of Technology Center 3700, whose telephone number is 703-308-0861. General inquiries can also be directed to the Patents Assistance Center whose telephone number is 800-786-9199. Furthermore, a variety of online resources are available at http://www.uspto.gov/main/patents.htm

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